Abstract of research papers

Supermicrosurgery and Head and Neck Reconstruction in Children
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Malignancies in the head and neck requires multidisciplinary treatment and collaboration among head and neck surgery, neurosurgery, and plastic and reconstructive surgery, as well as oral surgery, pediatrics, rehabilitation, and psychiatry. Head and neck reconstruction in children with the use of a free flap is characterized by small, short blood vessels, a relatively large head, and the need for consideration of disruption of growth disturbance at the donor site of the flap. The perforator flap has less donor site morbidity and is very useful in children. However, children have smaller vessels than adults, requiring supermicrosurgical techniques. Learning of supermicrosurgical techniques should have an important role in increasing the options in free flap transfer in children.

Whole Ovary Cryopreservation Applying Supercooling under Magnetic Field
Toyotaro Niino, Takashi Nakagaw, Shuhei Noguchi, Ikuma Sato, Tatsuro Kawai, Hiromasa Yamashita, Ken Masamune, Takeyoshi Dohi and Makoto Mihara

Chemotherapy and radiotherapy are performed for the treatment of cancer in children, especially leukemia. But, the side effects of these treatments are a problem of continuing concern, and improving the patient’s quality of life (QOL) following successful treatment remains a challenge. Especially with radiation therapy, disorders of reproductive function are considerable, and cases of infertility are extremely high. Currently, research on the cryopreservation of ovarian tissue is being energetically pursued, but because of factors such as reduction in number of egg cells and physical disruption due to tissue fragmentation, the successful fertilization rate of the thawed ovum has been extremely low. Accordingly, cryopreservation of the ovaries as an entire organ has been attempted, but this has yielded little success. This study focused on a method for cryopreservation through the application of supercooling under a variable magnetic field, and the development of a freezing system allowing for an arbitrary change in frequency of magnetic field applied to the specimen. To confirm the interrelation between a variable magnetic field and supercooling, physiological saline solution was frozen under a variable magnetic field, and the progress and stabilization of supercooling was verified for magnetic field frequencies from 200 to 200 kHz. Additionally, ovaries were frozen under magnetic field, and histological assessment of the tissue was performed.

Development of Pathology Specimen Preparation Method by Supercooling Cryopreservation under Magnetic Field
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Brain tumors have the highest incidence of childhood solid cancers and they also have the highest mortality rate among childhood cancers. One factor cited for improved prognosis in cancer is improvement in surgical extraction rate, but types of childhood brain tumors are more diverse in comparison to those of adults, and it is at present exceedingly difficult for even an experienced pathologist to perform an accurate diagnosis. We have developed a technique for freezing under magnetic field for the purpose of internal organ cryopreservation, and we conducted this study after considering that this freezing technique could be useful for rapid diagnosis utilizing frozen tissue during surgery. Results showed the arrangement of neurons to be in much better order with brain tissue frozen under magnetic field than that which was frozen by liquid nitrogen. For pancreatic tissue, it was found that insulin staining was clearer for freezing performed under magnetic field than with liquid nitrogen. In short, we found that this technique is not simply for the preservation of tissue, but has the potential to improve the accuracy of pathological diagnosis and surgical extraction rate as well as limiting chemotherapy and radiation therapy. This is the principal outcome that will contribute to an improved quality of life (QOL) for childhood cancer patients.